



MODEL FRENSOR MKII

The active road and runway condition sensor and IceFree System for operation with the AWS Model METEODATA-3000C



Frensor® is a patented system solution for an exact detection of freezing point temperature on roads and runways. Frensor® freezes road fluid to determine the exact freezing point, and is independent of de-icing fluid used. The correct freezing point is detected even if the fluid is contaminated with unknown chemicals like oil or alcohol. Typical applications are roadside applications, bridge sprayer systems and runways where correct and precise information is essential. Frensor® can also be used as a mobile application.

Frensor® uses a Peltier element to heat and cool the fluid on the sensor head. Tests show that active methods are best for determining freezing points. By placing up to 4 sensor heads at different locations on the road or runway, it is possible to get a reliable freezing point value, representative for a road or runway section.

For road installations it is recommended to do a climate mapping to find the most significant place, before installing **Frensor®** systems.

By using the Mobile Frensor® it is possible to perform freezing point mapping for a certain area.

The information can then be used to determine the amount of de-icing fluid (e.g. salt) to be spread at different sections of the road.

This active detector of the freezing point Temperature at the pavement surface is also the key element of our IceFree Automated Anti-Icing Spray System, briefly described also in this brochure



MOBILE INSTALLATION



SENSOR FRENSOR

DESCRIPTION	SPECIFICATION
De-icing fluid	Detects freezing point for any de-icing fluid. For example NaCl, CaCl ₂ , Urea, Clearway, etc
Road Status	Dry, wet, freezing point
Freezing point temperature detection range	-20 < t _f < 0 °Celsius, accuracy ±0.7° Celsius
Environment condition to get Freezing point	-40 < t _e < 20° Celsius
Freezing and environment temperature condition to get freezing points	t _f - t _e < 20 °Celsius
Environment temperature for electronics	-40 < t _e < +60° Celsius. Sensor will be in standby when environment temperature is too hot (above 20 °Celsius) or too cold (below -40 °Celsius)
Output and input	Serial RS232 command interpreter and one 4-20 mA output
Detection time	Normally 10 to 30 seconds- 3 seconds up to several minutes depending on environment conditions. Mobile version is faster
Logging	By METEODATA-3000C unit
Modem support via METEODATA unit	GSM/GPRS, Radio, Satellite, etc...
Power requirements	12V 3.5A (Up to 5A depending on the sensor model)
Size of sensor	Ø 40 mm, height 40 mm
Sensor type	Cu sensor body, weight Approx 300 gram each



IceFree **AUTOMATED ANTI-ICING** **SPRAY SYSTEM**



The **IceFree System** is a fixed automated anti-icing spray system, specifically designed for highway/roadway application. This anti-icing system uses a Fix Automated Spray Technology (FAST) that continuously monitors conditions of the pavement of roads and bridges or structures and based on the detection of critical threshold of several environmental parameters, automatically fires, spraying a chemical liquid solution , just in advance of icing conditions.

The spray is effectively applied to the driving surface under a range of weather conditions and, depending on how the programmable logic be configured, the system will continue to monitor conditions and automatically either repeatedly reapply the anti-icing chemical if the chemical becomes diluted or, deactivating the program in the event of a heavy snow. Deactivation is required since the IceFree is intended as an anti-icing solution , not a snow removal system.

The heart of the **IceFree System** is an advanced Automatic Weather Station (AWS) Model METEODATA-3000C, which integrates the active detector of the freezing point temperature at the pavement surface, Model Frensor MKII described previously. It also includes a number of sophisticated sensors for detecting the pavement conditions such as its temperature, the presence of water or ice, salts concentration , etc. as well a set of

meteorological sensors for the continuous measurement of all relevant environmental parameters: Temperature and Relative Humidity of air, the Dew Point, Wind Speed and Direction, Present Weather (Visibility and Precipitation Intensity with identification of rain, snow , etc.), Solar Radiation, heat soil flux, etc.

When the AWS detects the risk of ice formation over the pavement, a command is transmitted to the hydraulic installation for activating the spraying. So this unit is a typical Road Weather Information System (RWIS). So the iceFree System is made up of three subsystems :

- The RWIS for the Detection and Activation
- The FAST Subsystem Server
- The Hydraulic Subsystem

As a matter of fact the AWS Model METEODATA-3000C integrates both the RWIS and the FAST subsystems, as this unit is a very versatile electronic device. It also includes several communication ports for data transmission via GPRS, Ethernet, etc. to a Central Station where the Transportation Authorities or Maintenance Companies, would have the possibility of analysing the situation in base of the information received from the remote installation.